

REMARKS

In the Office Action, claims 1, 2, 6-10 and 12 are rejected under 35 U.S.C. §103(a) (First Rejection) as being unpatentable over Florin et al. in view of Lin et al., and further in view of Bergman et al., and claims 1, 3-7, 9-11 and 12-17 are rejected under 35 U.S.C. §103(a) (Second Rejection) as being unpatentable over Florin et al. in view of Lin et al., and further in of Bergman et al. Although the Second Rejection in paragraph 3 on page 4 of the office action is made over “Florin et al.” without mentioning Johansen, the detailed comments for the rejection are very confusing because they are mainly based on Johansen with some comments which seem to be editorial errors due to copy-and-paste from the First Rejection. **Applicants respectfully assume that the Second Rejection was made over Johansen** instead of “Florin et al.”.

As pointed out in Amendment A filed on 8/27/2007, the gist of the instant invention is to provide a surface plasmon resonance sensor with high sensitivity. The surface plasmon resonance sensor comprises a prism having a surface on which a metallic layer is coated, **a first dielectric layer having metallic nanoparticles** formed on the metallic layer, a light source giving off a light to the prism, the light being reflected by the surface of the prism to form a reflected light and a light detector for detecting the reflected light. The **dielectric laver having metallic nano-particles** is capable of enhancing the phenomenon of surface electromagnetic radiation so as to enhance the detecting sensitivity of the sensor significantly. The following analysis and comparison will provide applicants’ response with respect to the First and Second Rejections made in the final office action.

I. FIRST REJECTION

In the rejection of claims 1, 2, 6-10 and 12 under 35 U.S.C. §103(a) as being unpatentable over Florin et al. in view of Lin et al., and further in view of Bergman et al., the **examiner admits that both Florin and Lin fail to disclose “metallic nanoparticles” in a dielectric layer.** However, the examiner rejects claims 1 and 9-10 on the ground that Bergman shows that there is an interest and quite extensive research on the use of metallic nanoparticle layers in a dielectric material used in an SPR sensor.

In reviewing the disclosure of Bergman, applicants respectfully contend that the rejection is unwarranted because Bergman et al. never disclose or suggest a dielectric layer having metallic nanoparticles. Throughout the disclosure of Bergman et al., nowhere can **“metallic nanoparticles”** be found. As shown in FIG. 1(b) of Bergman, the metallic inclusion suggested is a V-shaped nanosized metallic formation in the xz-plane. **“The specific geometry** of a metal/dielectric nanosystem that we consider was introduced in our previous paper on ultrafast responses. This is a flat V-shaped metallic nano-inclusion positioned in the central xz-plane in two grid steps (2 to 10 um) thick in the y direction (page 2, col. 2 of Bergman)”. In other words, **the metallic inclusion occupies a V-shaped volume** in the dielectric host.

In the instant invention, as described in paragraph [0031], the **dielectric layer having metallic nanoparticles** is formed on the metallic layer by way of RF magnetron sputtering method using dielectric substance and the metal **for creating metallic nanoparticles as the target for being mixedly** deposited on the metallic layer. A person

of ordinary skill in the art would recognize the difference between a specific V-shape metallic inclusion in a dielectric layer of Bergman and nanoparticles mixedly formed in a dielectric layer. It would not be logical for a person of ordinary skill in the art to turn a V-shape metallic inclusion into a mixedly distributed metallic nanoparticles because the desired effect as taught by Bergman would no longer be maintained by doing so. Applicants respectfully contend that claim 1 of the instant invention is not obvious because the difference between the subject matters of Bergman and the instant invention is significant and results in different effect. Therefore, claim 1 should be allowable.

Applicants would like to point out that claim 3 of the instant invention specifically limits that the metallic nanoparticles have a diameter 1-50 nm. Because none of the prior arts cited by the examiner has even disclosed, taught, or suggested the concept or structure of a dielectric layer having metallic nanoparticles as claimed in claim 1, it would not be logical to a person of ordinary skill in the art to reach the subject matter of nanoparticles having a diameter 1-50 nm. Claim 3 should also be allowable.

With regards to claim 2 which recites a second dielectric layer coated on the first dielectric layer having metallic nanoparticles, the examiner cites Florin (col. 6 line 64-col. 7, line 19), which is excerpted in the following, as having disclosed such subject matter to reject the claim.

“If the invention is used in biosensor technology, an improved vertical resolution ability of the surface plasmon spectroscopy results by the use of the combination of

silver/gold film as compared with the pure gold film frequently used in biosensor technology. The gold surface is chemically preserved with respect to the applied specimen. The specimen is applied onto the contact point and/or the thin layer of material. A gas, a liquid, a solid film or the like may be used as a specimen. The contact point/layer of material is modified for the respective specimen in such fashion that only the respectively relevant magnitude is measured such as the concentration of a specific protein in a solution, the presence of a specific antibody or antigen in a solution, the concentration of a specific gas or of a liquid, changes in the state of aggregation of a substance or the like. Due to the size and the shape of the measuring signal of the sensor standardized to the impinging power density of the radiation energy, additional information on the interface of metal/dielectric can be obtained, which has not been accessible by means of the former processes. In addition to the use of surface plasmon spectroscopy, the invention and in particular the thermocouple can be used for the highly sensitive measurement of the surface temperature.”

Applicants carefully review the specification of Florin including the excerption above and can not find any disclosure of “a second dielectric layer coated on the first dielectric layer having metallic properties” stated by the examiner. It is, therefore, respectfully requested that the rejection be withdrawn.

II. SECOND REJECTION

As pointed out above, applicants assume that the rejection is over Johansen instead of Florin et al. Johansen discloses a surface plasmon sensor comprising a surface

on which an adhesion layer 230, a metallic film 220 and a linker layer 240 are formed. The adhesion layer 230 is preferably chromium or titanium. The linker layer 240 can be an alkane thiol. Nowhere has a “dielectric layer having metallic nanoparticles” ever been disclosed, anticipated or suggested by Johansen.

Although the examiner cites Johansen in the comments with respect to claim 1 in this section of rejection, it is evident that claim 1 is completely different from Johansen because only adhesion layer 230 (chromium or titanium) and metallic film 220 are disclosed by Johansen. The remaining comments in this section (page 4, last paragraph and page 5, first paragraph) appear to be duplicated from comments in the first rejection (page 3, first and second paragraphs). Based on the same arguments, analysis and comparison made in the above response to the First Rejection, applicants respectfully contend that claim 1 should be allowable because a person of ordinary skill in the art can not reach the instant invention even if Johansen is added as a reference.

For the same reasons, which will not be repeated here, discussed with respect to the First Rejection, claims 2 and 3 should also be allowable because they are not obvious under 35 U.S.C. §103(a) over the cited prior arts. Furthermore, claims 15-17 include the allowable subject matter “a dielectric layer having metallic nanoparticles” as in claim 1. Claims 15-17 should also be allowable.

III. CONCLUSION

From the foregoing discussion, it is clear that the instant invention differs from the cited prior arts. The physical difference results in different effects and is not obvious.

As shown above, claim 1-3 and 15-17 are allowable over the cited prior arts under 35 U.S.C. §103(a). By virtue of dependency, claims 4-14 should also be allowable. Prompt and favorable reconsideration of the application is respectfully solicited.

Respectfully submitted,

/Jason Z. Lin/

Jason Z. Lin
Agent for Applicant(s)
Reg. No. 37,492
Customer No. 33,804